B1012

PROPOSAL COVER SHEET

Proposal to: CALFED Bay-Delta Program Office

Submitting Organization:
The Regents of the University of California
University of California
One Shields Avenue
Davis, CA 95616

Title of Proposed Research: Enhancement of Fish Passage in Clear Creek

Total Amount Requested:	**Proposed Duration:**	**Desired Starting Date:**
$58,641	One Year	December 1, 1998
Principal Investigator:	**Department:**	**Phone Number:**
G. T. Orlob	CEE	(530) 752-1424

Checks made payable to:
The Regents of the University of California

Send checks to:
University of California
Davis Campus
Cashier's Office, 173 Mrak Hall
One Shields Avenue
Davis, CA 95616

Send Award Notice to:
Office of Research
410 Mrak Hall
University of California
One Shields Avenue
Davis, CA 95616-8671
(530) 752-2075/(530) 752-5432 (FAX)

Approvals:

6/24/98
Principal Investigator Date

6/24/98
Department Chair Date

6/25
Dean, College/School Date

Other Endorsement Date

JUN 29 1998
Official Signing for Organization Date

Sandra M. Dowdy
Contracts and Grants Analyst

I-008507

I-008507

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title:	Enhancement of Fish Passage in Clear Creek
Applicant Name:	Gerald T. Orlob, Ph.D., P.E.
Mailing Address:	Department of Civil and Environmental Engineering, University of California, One Shields Avenue, Davis, CA 95616
Telephone:	(530) 752-1424
Fax:	(530) 752-7872

Amount of funding requested: $58,641 for 1 year

Indicate topic for which you are applying:

- ☐ Fish Passage Assessment
- ☐ Floodplain and Habitat Restoration
- ☐ Fish Harvest
- ☐ Watershed Planning/Implementation
- ☐ Fish Screen Evaluations – Alternatives and Biological Priorities
- ☒ Fish Passage Improvements
- ☐ Gravel Restoration
- ☐ Species Life History Studies
- ☐ Education

Indicate geographic area of your proposal:

- ☐ Sacramento River Mainstem
- ☐ Delta
- ☐ Suisun Marsh and Bay
- ☐ San Joaquin River Mainstem
- ☐ Landscape (entire Bay-Delta watershed)
- ☒ Sacramento Tributary: Clear Creek
- ☐ East Side Delta Tributary: _____
- ☐ San Joaquin Tributary: _____
- ☐ Other: _____
- ☐ North Bay: _____

Indicate the primary species which the proposal addresses:

- ☐ San Joaquin and East Side Delta tributaries fall-run chinook salmon
- ☐ Winter-run chinook salmon
- ☐ Late fall-run chinook salmon
- ☐ Delta smelt
- ☐ Splittail
- ☐ Green sturgeon
- ☐ Migratory birds
- ☒ Spring-run chinook salmon
- ☐ Fall-run chinook salmon
- ☐ Longfin smelt
- ☒ Steelhead trout
- ☐ Striped bass

COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant:

☐	State agency	☐	Federal agency
☐	Public / Non-profit joint venture	☐	Non-profit
☐	Local government / district	☐	Private party
☒	University	☐	Other: _____

Indicate the type of project:

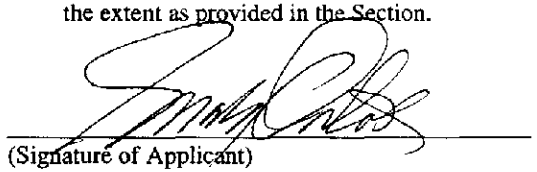
☒	Planning	☐	Implementation
☐	Monitoring	☐	Education
☐	Research		

By signing below, the applicant declares the following:

1. the truthfulness of all representations in their proposal;

2. the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and

3. the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.



(Signature of Applicant)

Executive Summary

ENHANCEMENT OF FISH PASSAGE IN CLEAR CREEK

Department of Civil and Environmental Engineering
University of California Davis

Project Description

Clear Creek, once a major chinook salmon and steelhead producing tributary of the Sacramento River, is now blocked by the CVP's Whiskeytown Dam, leaving about 16 miles of stream bed as restorable habitat. Due to blockage of their natural migratory pathways, spawning potentials for spring-run chinook salmon and steelhead are now restricted to a comparatively short 8-mile reach of the creek in the canyon just below the dam where flows can be partially regulated and where water temperatures may, under certain hydrological, meteorological and operating conditions, be suitable for spawning and incubation. In short, fish passage to spawning habitat in the upper reaches of Clear Creek is now severely restricted and the relationships between flows released from Whiskeytown Dam and water temperatures occurring in the channel downstream are uncertain. The primary biological objective of the proposed project is the restoration of unrestricted access by migrating salmon and steelhead to favorable spawning habitat in the reaches of Clear Creek below the dam.

Approach

Because flow in the creek is so variable, subject to regulation at the dam as well as by natural hydrologic conditions, there is an implicit dependence of water temperature on flow, i.e., on the hydrodynamics of the creek. In the interest of enhancing salmon propagation success in Clear Creek the relationship between these two environmental characteristics - flow and temperature - needs to be explicitly defined. Such definition will assist project operators and fisheries managers in determining for various hydrological and meteorological conditions the rates and timing of releases from Whiskeytown Dam needed to meet water temperature objectives within spawning reaches and downstream for fish migration, while at the same time conserving a limited water resource. A technical objective of this project is to quantify the relationship between water temperature and hydrodynamic conditions in Clear Creek from Whiskeytown Dam to the Sacramento River, over a range of environmental conditions suitable for spring run chinook salmon and steelhead propagation. Specific objectives include: assembly and evaluation of relevant data; development and implementation of field monitoring surveys; adaptation and calibration of existing mathematical models to simulate flows and temperatures; demonstration of the models' capabilities to predict Clear Creek's responses to changes in flow and water temperatures; and documentation of the data base, models and other attributes of the physical system that are relevant to enhancement of salmon passage and propagation in Clear Creek.

Scope of Work and Schedule

It is proposed to meet the above stated objectives by adapting a set of existing hydrodynamic and water quality models to Clear Creek, thereby providing the means to quantify the relationship(s) between flows and temperatures. These models, known as RMA2 (hydrodynamics) and RMA11 (water quality, including temperature) were previously developed, calibrated, verified and applied to the Sacramento and Feather rivers in a recently completed modeling project (Deas, et. al., 1996) and have been preliminarily adapted to Clear Creek in an investigation of the three-dimensional hydrodynamics of Whiskeytown Reservoir (UCD/USBR, 1996. The models utilize the finite element method to solve the equations of momentum and continuity (RMA2) and advection-dispersion (RMA11) for both steady and unsteady flow conditions. Output consists of temporal and spatial descriptions of velocities, flows, water levels and water temperatures over a grid representing the geomorphic characteristics of the stream channel.

Specific tasks include: (1) assembly and evaluation of data; (2) design and implementation of field surveys and controlled experiments to complete the data base; (3) adaptation of models to the specific geometry of Clear Creek; (4) calibration and verification of the models against field observations; (5) application of the models to predict flow-temperature relationships; and (6) project documentation, including the data base, models and other project accomplishments. It is expected that these tasks can be completed within one year from the start of the project.

Expected Benefits

The principal benefit of this project will be improved passage to an enhanced, secure habitat in the upper reaches of Clear Creek for spring run chinook salmon and steelhead. This benefit is expected to be realized by providing a unique capability to fisheries managers and project operators to determine locations along the creek below the dam where temperature objectives for different species can be attained and to estimate project releases required at these locations to assure most favorable habitat conditions.

Project Justification

Historically Clear Creek has been an important contributor to salmon production in the Sacramento River system, but its capability was limited by the construction of Whiskeytown Dam, which has confined rearing to reaches just below the dam where flows and temperatures conducive to successful spawning of spring-run chinook salmon and steelhead are largely governed by project operation. This project will provide state-of-the-art tools to improve the reliability of temperature prediction as affected by flow regulation, thereby enhancing prospects for rearing success. Achievement of project goals will be aided by utilizing existing calibrated mathematical models from the Sacramento River Temperature Modeling Project.

Budget Costs

It is estimated that the cost of the proposed project will not exceed $58,641. Matching contributions of $19,423 are available to the project. A detailed breakdown of costs is attached to the proposal.

Applicant Qualifications

This project is supported by many years of experience of the principal investigator, Dr. G. T. Orlob, in development and application of mathematical models for investigation of the hydrodynamic and water quality behavior of surface water systems. These have included modeling studies of many of the integral components of the Central Valley system, e.g., the Sacramento and Feather Rivers, Shasta, Trinity, Keswick, and Whiskeytown reservoirs, and the Sacramento-San Joaquin Delta. The models proposed for this project are original contributions of the principal investigator, his colleague Dr. Ian King, and their students at UC Davis. Graduate student participants in this project are experienced in modeling and field survey techniques.

Program Coordination

The proposed project will be coordinated with ongoing UC Davis projects sponsored by USEPA, USBR, USFWS, California Departments of Fish and Game and Water Resources, and the State Water Resources Control Board. Local support and coordination has been arranged with the DFG and the Western Shasta Resource Conservation District in Redding.

ENHANCEMENT OF FISH PASSAGE IN CLEAR CREEK

Principal Investigators:	Gerald T. Orlob, Professor Emeritus Department of Civil and Environmental Engineering University of California Davis, CA 95616 Tel: (530) 752-1424 Fax: (530) 752-7872 e-mail: gtorlob@ucdavis.edu Ian P. King, Professor Emeritus Department of Civil and Environmental Engineering University of California Davis, CA 95616 Tel: (530) 752-8386 Fax: (530) 752-7872 e-mail: ipking@ucdavis.edu
Organization Type:	University of California (Public Institution)
Tax Status:	Tax Exempt
Tax Identification	94-6036494-W
Collaborators:	California Department of Fish and Game U. S. Bureau of Reclamation Western Shasta Resource Conservation District (field and data assistance)

ENHANCEMENT OF FISH PASSAGE IN CLEAR CREEK

Department of Civil and Environmental Engineering
University of California Davis

I. Project Description and Approach

a. Geographic Setting

Clear Creek, once a major chinook salmon and steelhead producing tributary of the Sacramento River, is now blocked by the CVP's Whiskeytown Dam, leaving about 16 miles of stream bed as restorable habitat. (see Figure 1 attached for geographic location) Due to blockage of their natural migratory pathways, spawning potentials for spring-run chinook salmon and steelhead are now restricted to a comparatively short 8-mile reach of the creek in the canyon just below the dam where flows can be regulated and where water temperatures may, under certain hydrological, meteorological and operating conditions, be suitable for spawning and incubation. In short, fish passage in the upper reaches of Clear Creek is severely restricted and the relationships between flows released from Whiskeytown Dam and water temperatures occurring in the channel downstream are uncertain.

b. Ecological/Biological/Technical Justification

Critical concerns for salmon and steelhead in this environment are maintenance of flows and temperatures favorable to adult upstream migration, spawning, incubation of eggs, and out-migration of juveniles. In Clear Creek, as in many streams in Northern California, elevated water temperatures serve as the principal non-structural barriers to fish passage to preferred upstream spawning habitat. This proposal specifically addresses Target 2 of the Central Valley Stream flows Implementation Objective, Vol. II: ERPP which calls for increased releases from Whiskeytown Dam.. The relationships between flows and water temperatures in Clear Creek and their effects on fish passage and reproduction under the conditions of increased releases are the principal subjects of this proposal.

c. Technical Approach

Releases from Whiskeytown Dam to Clear Creek are governed primarily by operation of the Shasta-Trinity Division of the CVP which transfers water from Trinity Lake through Whiskeytown Reservoir to augment water supplied to the Central Valley. During drier than normal years when water demands are high a major portion of the water released from the reservoir passes to Keswick Reservoir through the Spring Creek Power Plant. Normally, at these times only flows needed for sustenance of salmon are released to Clear Creek. The magnitudes and temperatures of these flows are prime concerns of both project operators and fisheries biologists since the relationship between flows and temperatures in the Clear Creek environment is as yet unclear. Thermal stratification in Whiskeytown Reservoir is a major factor governing the temperatures of releases to both Clear and Spring Creeks, the only outlets of the reservoir. Downstream in the Clear Creek channel, changes in water temperatures are determined by the rate and temperature of the released flow, heat exchanges through the air-water interface and accretions or depletions of ground and surface waters during the course of transit downstream. Because flow in the creek is so variable, subject to regulation at the dam as well as by natural hydrologic conditions, there is an implicit dependence of water temperature on flow, i.e., on the hydrodynamics of the creek. In the interest of enhancing salmon propagation success in Clear Creek the relationship between these two environmental characteristics - flow and temperature - needs to be explicitly defined. Such definition will assist project operators and fisheries managers in determining for various hydrological and meteorological conditions the rates and timing of releases from Whiskeytown Dam needed to meet water temperature objectives within spawning reaches and downstream for fish migration, while at the same time conserving a limited water resource.

d. Project Objectives

The principal objectives of this project are to quantify the relationships between water temperatures and hydrodynamic conditions in Clear Creek from Whiskeytown Dam to the Sacramento River, over a range of environmental conditions suitable for propagation of spring run chinook salmon and steelhead in the upper 8 miles of the creek and to assess the potential benefits derived for these species by improving fish passage to and from upstream spawning grounds. It is proposed that these objectives be achieved by conducting field surveys of the creek, performing controlled release experiments, and utilizing existing mathematical models previously developed, calibrated, and applied in a study of temperature management for the Sacramento River (Deas, et. al, 1996).

Specific objectives of the proposed project are as follows:

1. to assemble and evaluate existing hydrologic, geomorphic, atmospheric, water temperature, and reservoir operation data relevant to hydrodynamic and temperature behavior of Clear Creek and to determine data deficiencies,
2. to design and implement field programs and surveys to supplement existing data on geomorphology of the creek, water temperatures, flows, and meteorological conditions,
3. to conduct studies of the effects on water temperature of controlled releases from Whiskeytown Dam over a range of realistic operating conditions of the Shasta-Trinity Division of the CVP, (ref. ERPP Executive Summary p. 45)
4. to adapt, calibrate, and verify existing mathematical models to simulate hydrodynamics and temperatures in Clear Creek for both observed and possible future hydrologic and meteorological conditions ,
5. to utilize results of modeling to develop the relationships between flows and water temperatures in Clear Creek as functions of project operation and meteorological conditions corresponding to the critical periods of spring-run salmon and steelhead spawning, incubation and out-migration, and
6. to document the basic morphological, hydrological, meteorological and other attributes of Clear Creek related to maintenance and/or enhancement of salmon and steelhead populations, thus providing an operational guide for both project and fisheries managers.

II. Proposed Scope of Work

To meet the objectives listed above the following tasks must be completed.

Task 1: Data Acquisition and Evaluation

Purpose: To provide data and information necessary to develop an enhanced understanding of the flow and water temperature characteristics of Clear Creek. Specific attention will be given to data needs to develop flow-temperature relationships for Clear Creek.

Essential data include channel elevations, cross-sections, and gradients, water temperatures, flows, and meteorological conditions. Some channel cross-section data acquired from the Department of Water Resources (DWR) in Redding have been useful in preliminary structuring of the models, but these data are not current nor sufficient in coverage of the creek channel, especially in the upper 5 miles or so of the creek where channel walls are steep and irregular. Moreover, recent flood events have modified the channel's configuration in its lower reaches, requiring resurvey. Photogrametric stereo pairs obtained by the Department of Fish and Game (DFG) and maintained in the files of the Western Shasta Resource Conservation District (WSRCD) will be used in assessing the influence of riparian vegetation shading on water temperatures in the upper reaches of the creek.

Water temperature data for Clear Creek are sparse, limited to a few short records obtained from continuous sensors in the middle reaches of the creek. An example is shown in attached Figure 2. Unfortunately, these data are not accompanied by reliable flow data. There is a need to

develop simultaneous observations of temperature and flow over the range of interest, say for flows from 50 to 250 cfs. It is proposed that a set of controlled flow experiments be carried out during the summer months when simultaneous observations can be made of water temperatures, flows, and meteorological parameters, e.g., air temperatures, relative humidity, wind velocity, cloud cover, etc., under conditions of controlled steady releases from the dam. Arrangements have been made with the DFG and USBR project managers to conduct these experiments, most likely in the next two summer seasons.

Meteorological observations required by the models for calculation of heat exchange through the air-water interface are available at a met station recently installed and operating at Whiskeytown Reservoir in support of a related hydrodynamic modeling project for Whiskeytown Reservoir (UCD/USBR, 1996). Controlled flow experiments are currently being designed in collaboration with the DFG, USBR and USFWS.

Products: Data bases that characterize the morphology, hydrology, meteorology, hydrodynamics and temperature conditions of Clear Creek below Whiskeytown Dam.

Task 2: Design and Implementation of Field Monitoring Program

Purpose: To obtain complete descriptions of physical, hydrological, hydrodynamic, meteorological and water temperature conditions in the Clear Creek system.

In addition to the controlled flow experiments noted in Task 1 above, it is proposed to conduct field monitoring of water temperatures over extended periods of variable operation by deploying continuous recording sensors, e.g., Onset Instruments thermistors or equivalent, at 6 to 8 stations along the creek. These stations will be operated for periods of up to five months spanning periods critical for salmon and steelhead passage and spawning. Data collected will be supplemented by observations made during the controlled flow experiments. A goal of this effort will be development of time series of temperatures, such as that shown in Figure 2, sufficient to characterize both temporal and spatial variations in water temperatures in Clear Creek and to allow representation of these in mathematical models of hydrodynamics and water quality.

Time series of Clear Creek flows that coincide with temperature monitoring will be available from USBR's CDEC (California Data Exchange Center) web site for Whiskeytown Dam and from the USGS gaging station at Igo. To extend flow data spatially it is proposed that field surveys at other locations along the creek be conducted on at least two occasions during the controlled flow experiments. Field surveys will provide both instantaneous flows, water depths and cross-sections in sufficient detail to describe flow variations along the 16-mile reach of the creek. Equipment for field investigations, e.g., a Marsh-McBirney flow meter, a Hydrolab and thermistors , are available at no cost to the project. Additional data on stream channel morphology, local topography, and riparian vegetation shading along the channel will be developed from photogrametric information available from the WSRCD and from field observations using global positioning satellite (GPS) instrumentation, also available without cost to this project.

Meteorological data required for modeling includes dry and wet bulb air temperatures, relative humidity, wind velocity and cloud cover. These will be derived from continuous observations at the Whiskeytown Met Station and at the Redding Airport Station. The USBR Whiskeytown modeling project has supported the development of the met station and data will be available for use in the proposed project.

Products: Data sets from controlled experiments of flow-temperature relationships for Clear Creek.

Task 3: Model Adaptation

Purpose: To adapt existing hydrodynamic and temperature models to Clear Creek for simulation of flow-temperature relationships in Clear Creek.

A preliminary finite element grid has already been developed in connection with the Whiskeytown modeling project, but it needs refinement in geometric representation of the Clear Creek channel, especially in the upper reaches. Field measurement of flows (Task 2) will provide some new information on cross sections, although the initial grid, based on prior surveys by DWR, provides a good starting point. Once the grid is refined to assure stability in hydrodynamic computation, the models can be calibrated and verified against field observations. It is proposed to utilize two existing finite element models, known as RMA2 (hydrodynamics) and RMA11 (water quality) to simulate the flow-temperature regime of Clear Creek. RMA2 is a mathematical model that solves the hydrodynamic equations of momentum and continuity over the grid space using the finite element method. It provides either steady state or dynamic descriptions of velocities, flows, and water levels for a discretized system of elements representing the physical system. A preliminary simulation showing variations in velocity and water depth along Clear Creek under conditions of a steady flow is illustrated in Figure 3 attached.

Information derived from RMA2 will be provided as input to RMA11, a companion water quality model that will simulate the dynamics of temperature change throughout Clear Creek from the dam to its confluence with the Sacramento River. Results from RMA11 will be in the form of time series of water temperatures that may be compared against those actually observed at selected sites along the creek. The models are currently operational, having been developed and tested in previous projects., including the main stems of the Sacramento and Feather rivers and the Klamath River below Iron Gate Dam. As noted above, they have also been adapted to Clear Creek in a preliminary study related to the Whiskeytown hydrodynamic modeling project, but they have not yet been calibrated for lack of reliable field data, such as is proposed to be acquired in this project. (Note: Development costs for the models have been covered in previous projects; no such costs are provided for in this proposal.)

Products: Operational hydrodynamic and temperature models adapted to Clear Creek

Task 4: Calibration of Clear Creek Models

Purpose: To calibrate and verify models against field observations of flows and temperatures

It is proposed to develop data sets sufficient in temporal and spatial coverage for calibration of the models over the ranges of flows and temperatures critical for fish passage and propagation. In the calibration process adjustments in channel roughness (Manning n) will be used to confirm the models' abilities to simulate observed flows and to emulate the transit time of temperature pulses along the creek. Water temperature simulations will be adjusted as necessary using the heat budget parameters incorporated in RMA11. Experience in modeling the Sacramento River System has shown that the two models can be used in tandem to improve calibration, since the phase of the simulated diurnal pattern of temperature (Figure 2) is dependent upon the flow velocity derived from the hydrodynamic model. Channel roughness adjustments within a range typical of steep channels such as Clear Creek may be used to assure agreement between predicted and observed diurnal temperature patterns.

Products: Calibrated hydrodynamic and temperature models available for application to Clear Creek.

Task 5: Application of Flow-Temperature Relationships

Purpose: To demonstrate application of Clear Creek models to predict flows and water temperatures as functions of hydrological, hydrodynamic, meteorological and operational conditions.

Once calibrated and tested, the models will be applied to demonstrate their use in prediction of water temperature responses to changes in flows and temperatures of releases from Whiskeytown Dam, or at other selected locations along the creek, given specified hydrological and meteorological boundary conditions. The sensitivity of the model to variations in parameters, coefficients, and boundary conditions will be developed in an organized program of simulations.

Product: A guide to management of fish passage in Clear Creek that will enable project operators and fisheries biologists to determine optimal schedules of releases that will assure unimpaired fish passage and spawning habitat for spring-run chinook salmon and steelhead.

Task 6: Project Documentation

Purpose: Documentation flow-temperature relationships for the Clear Creek environment, and other project accomplishments

Product: A detailed report covering all aspects of the project, including basic data, models, flow-temperature relationships, a project management guide, and demonstrations of application of project results and products.

III. Expected Benefits

The principal expected benefit of this project will be improved fish passage to and from the upper reaches of Clear Creek and an enhanced understanding of the necessary conditions for the long term propagation of spring-run chinook salmon and steelhead. This goal is expected to be achieved by providing a unique capability to fisheries managers and project operators in the form of calibrated mathematical models that quantify the interrelationships between flows and water temperatures in Clear Creek. Collateral benefits of the project may be in several forms, as follows:

1. a detailed characterization of the physical environment of Clear Creek, including stream morphology, riparian habitat and operational facilities,

2. a data base of physical, hydrologic, hydrodynamic, meteorological and water temperature characteristics of the Clear Creek environment,

3. a characterization of the Clear Creek environment in quantitative terms of flows and water temperatures for any given set of hydrologic, meteorological or project operation boundary conditions,

4. a means for determining the best operating schedule for releases from Whiskeytown Reservoir that will assure maintenance of a healthy habitat for chinook salmon and steelhead propagation throughout Clear Creek,

5. a means to quantify the effects of physical or operational changes in the Clear Creek-Whiskeytown system on the flow and temperature regimes of Clear Creek, and

6. an operational guide to aid fisheries managers and project operators in enhancing habitat for long term propagation of spring-run salmon and steelhead in Clear Creek.

IV. Products

The principal products of this project will be improved fish passage and enhanced propagation potential for spring-run chinook salmon and steelhead in Clear Creek. This goal will be reached by utilizing flow-temperature relationships for Clear Creek derived by applying hydrodynamic and temperature models. These tools will utilize a supporting data base of physical, hydrological, and meteorological information that characterizes the Clear Creek environment for the benefit of spring-run chinook salmon and steelhead. The calibrated Clear Creek models will be made available with user manuals to project operators and collaborators. A detailed final report will be provided documentation of all project accomplishments.

V. Collaborating Agencies , Local Interests, and Third Party Impacts

The California Department of Fish and Game will make available monitoring data on stream temperatures. The California Department of Water Resources has provided its most recent surveys of cross sections of Clear Creek. Meteorological data will be supplied the U. S. Bureau of Reclamation from the Whiskeytown Reservoir Station. Photogrametric pairs of the upper reaches of the creek are available through the courtesy of the Western Shasta Resource Conservation District.

No adverse third party impacts are anticipated in this project.

VI. Matching Contributions

The Principal Investigators for the project will receive no compensation for technical direction of the project, which at a work level of 5 percent is equivalent to a salary cost of $14,423. Additionally, survey equipment with an equivalent value of $5,000 is available at no cost to the project.

VII. Budget Costs

Total estimated costs for the project are $58,641. Matching contributions total $19,423. A detailed budget is attached.

VIII Schedule Milestones

The project is expected to be completed in one year. Anticipated start/completion dates by tasks and months from the beginning of work are as follows:

Task	Start	Complete
1. Data Acquisition	0	2
2. Design Field Surveys	0	1
3. Model Adaptation	2	4
4. Calibration	4	8
5. Application	8	10
6. Documentation	10	12

IX . References Cited

Deas, M., et. al, Sacramento River Temperature Modeling Project, Final Report to State Water Resources Control Board, December 1996

UCD/USBR, Temperature Regulation Through Whiskeytown Reservoir, Investigation in progress, 9/1/96 - 8/31/98

Budget Costs

	Requested funds	Matching contribution
Direct Salary and Benefits		
A. Personnel		
1. Principal Investigator; 12 mo. @ 5% (see note 1)		$7,361
2. Co-principal Investigator; 12 mo. @ 5% (see note 1)		$5,847
3. PGRE IV, student; $2,759; 3 mo. @ 75% (summer only)	$6,208	
4. PGRE I, student; $2,426; 9 mo. @ 50%, 3 mo. @ 100%	$18,195	
5. Undergraduate assistant; 9 mo. @ $400, 3 mo. @ $1000	$6,600	
6. Staff technical assistant	$1,704	
Subtotal, personnel	$32,707	$13,208
B. Fringe Benefits		
0.092 x (A1+A2) (see note 1)		$1,215
0.044 x (A3+A4)	$1,074	
0.235 x (A6)	$400	
Subtotal, benefits	$1,474	$1,215
Miscellaneous Direct Costs		
C. Travel	$1,000	
D. Supplies	$1,000	
Subtotal, miscellaneous	$2,000	$0
Equipment Costs		
E. Equipment: temperature loggers	$1,560	
Equipment (See note 2)		$5,000
Subtotal, equipment	$1,560	$5,000
Overhead and Fees		
F. Student Fees	$4,800	
G. Overhead 0.445 x (A + B + C + D) (federal contract rate)	$16,100	
Subtotal, overhead	$20,900	$0
Project Total	$58,641	$19,423

Notes:

1. Salaries and fringe benefits for principal investigator and co-principal investigator have been calculated as 5% equivalent time, based on academic salary. The PI and Co-PI are providing time to the proposed project as matching in-kind services.

2. The equipment currently available in-house that will be used for the proposed project includes: Stowaway temperature loggers, HydroLab H20 Multiprobe, Marsh McBirney velocity meter, and surveying equipment. The matching contribution for equipment costs is estimated based upon usage anticipated for the proposed project and an estimate of an annual depreciation of capital costs. Use of the equipment is effectively being provided at no cost to the project.

Estimated Cost Breakdown by Task	Requested funds
1. Data Acquisition and Evaluation	$5,000
2. Field Monitoring	12,000
3. Model Adaptation	13,500
4. Calibration and Verification	13,000
5. Model Application	11,500
6. Documentation	3,641
Project Total	$58,641

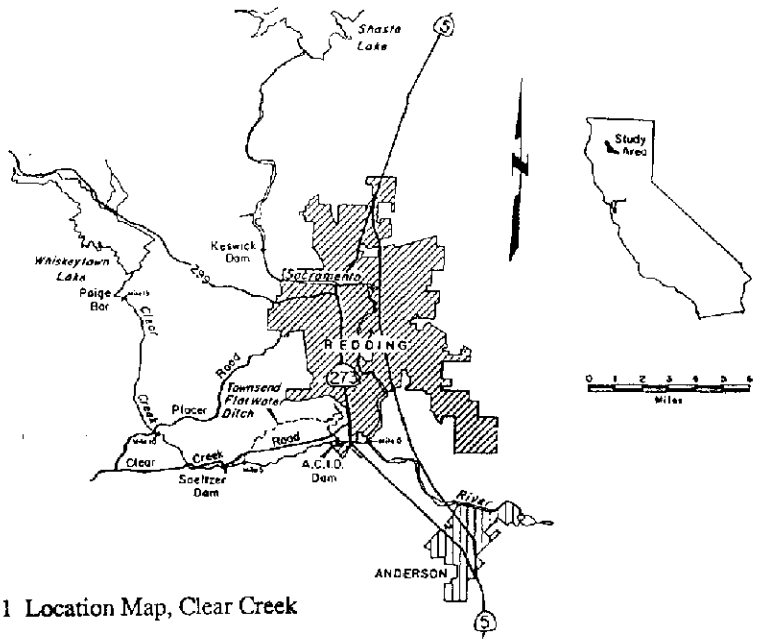


Figure 1 Location Map, Clear Creek

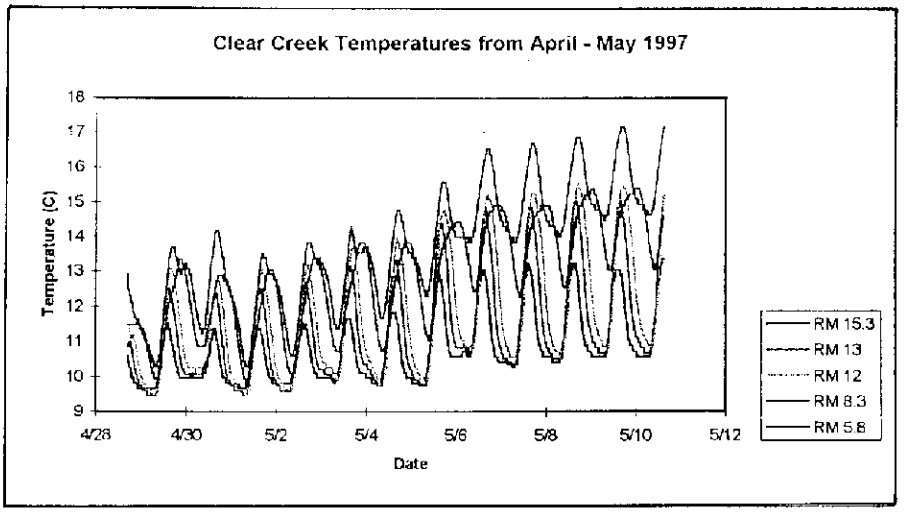


Figure 2 Water Temperatures at Five Locations Along Clear Creek

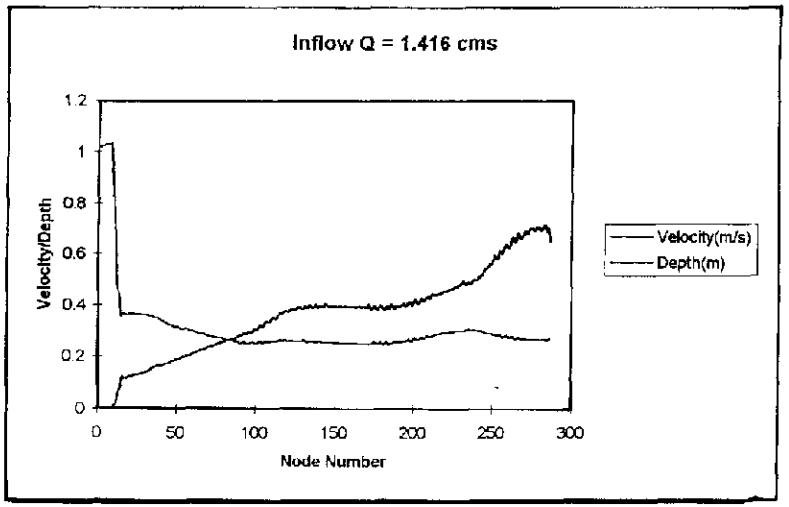


Figure 3 Simulated Velocities and Depths Along Clear Creek, Preliminary Study

ENHANCEMENT OF FISH PASSAGE IN CLEAR CREEK

Applicant Qualifications

This project is an outgrowth of a series of research and development projects conceived and directed by the principal investigator, both in consulting engineering practice and at the University of California Davis. This activity has resulted in the development of original mathematical models for the simulation of hydrodynamics and water quality in surface water systems, rivers, lakes, reservoirs, estuaries, and coastal waters. Among these are models that have been applied to many of the surface water bodies of concern in the CAL-FED Program, including the Sacramento and Feather rivers; Shasta, Trinity, and Keswick Reservoirs, Clear Lake, the Sacramento-San Joaquin Delta, and San Francisco Bay. Most recently three of these models: RMA2, RMA11 (proposed to be used in this project) and WQRRS, were adapted and applied to the Sacramento and Feather river systems from their upstream impoundments to the Delta for simulation of hydrodynamics and temperatures (Deas, et.al. 1996). In related investigations these models are being extended and applied to the Delta under support from the National Science Foundation and the Environmental Protection Agency and to Whiskeytown Reservoir in a project funded by the U.S. Bureau of Reclamation. The major part of this work has been carried out by graduate student researchers in the Water Resources and Environmental Engineering Modeling Group of the Department of Civil and Environmental Engineering at UC Davis.

The proposed project will be directed by Dr. G. T. Orlob, Professor Emeritus of Civil and Environmental Engineering, as Principal Investigator. Dr. Ian King, developer of the RMA models will serve as Co-PI advisor to the project. Both Drs. Orlob and King will serve without cost to the project. Ms. Joanna Fellos, Graduate Research Assistant, will serve a Project Engineer-Manager. Ms. Xiaochun Wang, doctoral candidate at UC Davis, will serve as consultant on model application.. An undergraduate student assistant will provide support in data collection and analysis. Brief biosketches of the PIs, Ms. Fellos and Ms. Wang are provided below.

Gerald T. Orlob, Principal Investigator

Dr. Orlob is presently Professor Emeritus of Civil and Environmental Engineering at the University of California at Davis. He holds degrees in civil, environmental and hydraulic engineering and is a registered professional engineer in California. Throughout a career in professional practice, engineering education, and research he has specialized in the development and application of systems analysis techniques, especially mathematical models of surface water systems, for water quality management. He has published widely in the technical literature. His contributions in his field of specialization have been recognized by awards from professional and scientific organizations and election to the National Academy of Engineering and to Honorary Membership in the American Society of Civil Engineering. As an emeritus professor he continues active participation in research related to water quality issues, recently focused on temperature control in northern California river systems, e.g., Sacramento, Trinity, Feather, Shasta, and Klamath rivers, and the Sacramento-San Joaquin Delta.

Ian P. King, Co-Principal Investigator

Dr. King is Profesor Emeritus of Civil and Environmental Engineering at the the University of California at Davis. He hold degrees in civil engineering and engineering mechanics. Dr. King is the original developer of the finite element models proposed for this project. He is internationally recognized for his original contributions to mathematical modeling and simulation of surface water systems. He has served as Co-PI on several projects of the UCD Modeling Group and will continue to advise the proposed project in model applications to Clear Creek.

Joanna Fellos

Ms. Fellos is a graduate student in the masters program of water resources and environmental engineering at the University of California at Davis. She has completed one half of her course work for the masters degree and intends to use Clear Creek a subject of her masters thesis. During the past year she was engaged in a research project dealing with the effects of riparian vegetation on water temperatures in the Sacramento River. She has experience in monitoring stream flows, water temperatures, and meteorological phenomena related to heat exchange processes in riverine systems and in analysis and interpretation of hydrologic and meteorologic information. She is currently applying mathematical models in preliminary investigation of flow-temperature relationships in surface water systems.

Xiaochun Wang

Ms. Wang is a graduate student in the doctoral programs of water resources and environmental engineering at the University of California at Davis. She completed all course work for a Ph.D. degree and advanced to candidacy in the fall of 1997. She is experienced in the application of finite element models for simulation of hydrodynamics, sediment transport and temperatures in both riverine and estuarine systems. Ms. Wang has served as project engineer on projects concerned with climate change effects on water quality in Shasta Lake, temperature simulation of Trinity Reservoir, restoration of marshlands in San Pablo Bay, and application of a two-dimensional hydrodynamic model for investigation of sediment transport in the Delta. She is currently investigating the three-dimensional hydrodynamics of Whiskeytown Reservoir. In a preliminary study related to the Whiskeytown project she adapted RMA2 and RMA11 to Clear Creek to establish the feasibility of employing the models to determine flow-temperature relationships, as would be developed in the proposed project.

U.S. Department of the Interior

Certifications Regarding Debarment, Suspension and Other Responsibility Matters, Drug-Free Workplace Requirements and Lobbying

Persons signing this form should refer to the regulations referenced below for complete instructions:

Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions - **The prospective primary participant further agrees by submitting this proposal that it will include the clause titled, "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.** See below for language to be used or use this form for certification and sign. (See Appendix A of Subpart D of 43 CFR Part 12.)

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions - (See Appendix B of Subpart D of 43 CFR Part 12.)

Certification Regarding Drug-Free Workplace Requirements - Alternate I. (Grantees Other Than Individuals) and Alternate II. (Grantees Who are Individuals) - (See Appendix C of Subpart D of 43 CFR Part 12)

Signature on this form provides for compliance with certification requirements under 43 CFR Parts 12 and 18. The certifications shall be treated as a material representation of fact upon which reliance will be placed when the Department of the Interior determines to award the covered transaction, grant, cooperative agreement or loan.

PART A: Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions

CHECK X IF THIS CERTIFICATION IS FOR A PRIMARY COVERED TRANSACTION AND IS APPLICABLE.

(1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;

(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

(2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

PART B: Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

CHECK__IF THIS CERTIFICATION IS FOR A LOWER TIER COVERED TRANSACTION AND IS APPLICABLE.

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

DI-2010
June 1996
(This form replaces DI-1953, DI-1954, DI-1956, DI-1960 and DI-1963)

PART C: Certification Regarding Drug-Free Workplace Requirements

CHECK ✓ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS NOT AN INDIVIDUAL.

Alternate I. (Grantees Other Than Individuals)

A. The grantee certifies that it will or continue to provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing an ongoing drug-free awareness program to inform employees about--
(1) The dangers of drug abuse in the workplace;
(2) The grantee's policy of maintaining a drug-free workplace;
(3) Any available drug counseling, rehabilitation, and employee assistance programs; and
(4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will –
(1) Abide by the terms of the statement; and
(2) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(e) Notifying the agency in writing, within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(f) Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted –
(1) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a) (b), (c), (d), (e) and (f).

B. The grantee may insert in the space provided below the site(s for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city, county, state, zip code)

_____

_____

_____

Check___ if there are workplaces on file that are not identified here.

PART D: Certification Regarding Drug-Free Workplace Requirements

CHECK___ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS AN INDIVIDUAL.

Alternate II. (Grantees Who Are Individuals)

(a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in conducting any activity with the grant;

(b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity, he or she will report the conviction, in writing, within 10 calendar days of the conviction, to the grant officer or other designee, unless the Federal agency designates a central point for the receipt of such notices. When notice is made to such a central point, it shall include the identification number(s) of each affected grant.

DI-2010
June 1995
(This form replaces DI-1953, DI-1954, DI-1955, DI-1956 and DI-19031

PART E: Certification Regarding Lobbying
Certification for Contracts, Grants, Loans, and Cooperative Agreements

CHECK X IF CERTIFICATION IS FOR THE AWARD OF ANY OF THE FOLLOWING AND THE AMOUNT EXCEEDS $100,000: A FEDERAL GRANT OR COOPERATIVE AGREEMENT; SUBCONTRACT, OR SUBGRANT UNDER THE GRANT OR COOPERATIVE AGREEMENT.

CHECK __ IF CERTIFICATION IS FOR THE AWARD OF A FEDERAL LOAN EXCEEDING THE AMOUNT OF $150,000, OR A SUBGRANT OR SUBCONTRACT EXCEEDING $100,000, UNDER THE LOAN.

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

As the authorized certifying official, I hereby certify that the above specified certifications are true.

THE REGENTS OF THE UNIVERSITY
OF CALIFORNIA

Sandra M. Dowdy

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL

Sandra M. Dowdy
Contracts and Grants Analyst

TYPED NAME AND TITLE

DATE JUN 29 1998

DI-2010
June 1996
(This form replaces DI-1052, DI-1054, DI-1055, DI-1056 and DI-1057)

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Figure 1

Standard Form 424

APPLICATION FOR FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

2. DATE SUBMITTED: 7/1/98	Applicant Identifier: N/A
1. TYPE OF SUBMISSION: Application — ☐ Construction ☒ Non-Construction; Preapplication — ☐ Construction ☐ Non-Construction	3. DATE RECEIVED BY STATE: N/A
	4. DATE RECEIVED BY FEDERAL AGENCY:
	State Application Identifier: N/A
	Federal Identifier:

5. APPLICANT INFORMATION

Legal Name: The Regents of the Univ. of Calif.	Organizational Unit: College of Engr: CEE
Address (give city, county, state, and zip code): Office of the Vice Chancellor for Research 410 Mrak Hall, One Shields Avenue Univ. of Calif., Davis, CA 95616	Name and telephone number of person to be contacted on matters involving this application (give area code): Sandra Dowdy, Contracts & Grant Analyst (530 752-2075

6. EMPLOYER IDENTIFICATION NUMBER (EIN): 9 4 - 6 0 3 6 4 9 4

7. TYPE OF APPLICANT: (enter appropriate letter in box) I

A. State; B. County; C. Municipal; D. Township; E. Interstate; F. Intermunicipal; G. Special District; H. Independent School Dist; I. State Controlled Institution of Learning; J. Private University; K. Indian Tribe; L. Individual; M. Profit Organization; N. Other (Specify)

8. TYPE OF APPLICATION:

☒ New ☐ Continuation ☐ Revision

If Revision, enter appropriate letter(s) in box(es): ☐ ☐

A. Increase Award; B. Decrease Award; C. Increase Duration; D. Decrease Duration; Other (specify):

9. NAME OF FEDERAL AGENCY:
U.S. Bureau of Reclamation
(CALFED Bay-Delta Program)

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: ☐☐ - ☐☐☐

TITLE: N/A

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:
Enhancement of Fish Passage in Clear Creek

12. AREAS AFFECTED BY PROJECT (Cities, Counties, States, etc.):
United States

13. PROPOSED PROJECT

Start Date: 12/1/98 — Ending Date: 11/30/99

14. CONGRESSIONAL DISTRICTS OF:

a. Applicant: III — b. Project: III

15. ESTIMATED FUNDING:

a. Federal	$ 58,641 .00
b. Applicant	$ 19,423 .00
c. State	$ .00
d. Local	$ .00
e. Other	$ .00
f. Program Income	$ .00
g. TOTAL	$ 78,064 .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE _____

b. NO. ☒ PROGRAM IS NOT COVERED BY E.O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

☐ Yes If "Yes," attach an explanation ☒ No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT. THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title: Sandra M. Dowdy Contracts and Grants Analyst	c. Telephone Number: (530) 752-2075
d. Signature of Authorized Representative: Sandra M. Dowdy		e. Date Signed: JUN 29 1998

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Standard Form 424 (REV. 4-92)

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I-008527

Figure 2

Standard Form 424A

OMB Approval No. 0348-0044

BUDGET INFORMATION - Non-Construction Programs

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. CALFED		$	$	$ 58,641	$ 19,423	$ 78,064
2.						
3.						
4.						
5. Totals		$	$	$ 58,641	$ 19,423	$ 78,064

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
a. Personnel	$ 32,707				$ 32,707
b. Fringe Benefits	1,474				1,474
c. Travel	1,000				1,000
d. Equipment	1,560				1,560
e. Supplies	1,000				1,000
f. Contractual					
g. Construction					
h. Other	4,800				4,800
i. Total Direct Charges (sum of 6a-6h)	42,541				42,541
j. Indirect Charges	16,100				16,100
k. TOTALS (sum of 6i and 6j)	$ 58,641	$	$	$	$ 58,641
7. Program Income	$	$	$	$	$

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Prescribed by OMB Circular A-102

I—008528

I-008528

Figure 2

Standard Form 424A (cont'd.)

SECTION D - NONFEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8. CALFED Bay Delta-Program	$ 19,423	$	$	$ 19,423
9.				
10.				
11				
12. TOTAL (sum of lines 8 – 11)	$ 19,423	$	$	$ 19,423

SECTION E - FORCASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 58,641	$ 14,661	$ 14,660	$ 14,660	$ 14,660
14. NonFederal	19,423	4,856	4,856	4,856	4,855
15. TOTAL (sum of lines 13 and 14)	$ 78,064	$ 19,517	$ 19,517	$ 19,517	$ 19,415

SECTION F - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (Years) (b) First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16-19)	$	$	$	$

SECTION G - OTHER BUDGET INFORMATION

21. Direct Charges: $42,541

22. Indirect Charges: 44.5% of MTDC

23. Remarks:

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Standard Form 424A (Rev. 4-92) Page 2

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I-008529

Figure 3

Standard Form 424B

OMB Approval No. 0348-0040

ASSURANCES — NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET, SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of United States, and if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U. S. C. §4728-4763) relating to prescribed standards for merit systems for programs funded under one of the nineteen statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C. F. R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U. S. C. §1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U. S. C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U. S. C. §6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P. L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

Figure 3

Standard Form 424B (cont'd.)

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a - 7), the Copeland Act (40 U.S.C. §§276c and 18 U. S. C. §§874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clear Air) Implementation Plans under Section 176(c) of the Clear Air Act of 1955, as amended (42 U.S.C. §§ 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended, (P.L. 93-523); and (h) protection of endangered species under the Endangered Species Act of 1973, as amended, (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. 2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§ 4801 et seq.) which prohibits the use of lead based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act of 1984 or OMB Circular No. A-133, Audits of Institutions of Higher Learning and other Non-profit Institutions.

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
Sandra M. Dowdy	Sandra M. Dowdy Contracts and Grants Analyst
APPLICANT ORGANIZATION	DATE SUBMITTED
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA	JUN 29 1998

Standard Form 424B (Rev. 4-92) back

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